**Proceedings Series on Health & Medical Sciences, Volume 5**
**Proceedings of the 4th International Nursing and Health Sciences**
ISSN: 2808-1021

# The Effectiveness of Rheumatic Gymnastics on Patella Joint Flexibility in Elderly with Rheumatoid Arthritis at the Elderly Integrated Service Post (Posyandu Lansia) in Mipiran Village, Purbalingga

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**ARTICLE INFO**

***Article history:***

DOI:
10.30595/pshms.v5i.960

Submitted:
Oct 13, 2023

Accepted:
Feb 25, 2024

Published:
Mar 20, 2024

***Keywords:***

Rheumatoid arthritis, Rheumatic gymnastics, Joint flexibility

**ABSTRACT**

*Background: Based on data from the 2018 Riskesdas, 7.30% of the Indonesian population is estimated to suffer from rheumatoid arthritis. Rheumatoid arthritis (RA) is a chronic disease that causes joint pain, swelling, stiffness, and limited joint movement. As the most common autoimmune rheumatic disease, rheumatoid arthritis is a chronic inflammatory condition that permanently damages the joints, where the body's immune system, which generally protects the body from infections and diseases, attacks joint tissues for unknown reasons. Method: The research design used in this study was the Pre-Experimental one-group pre-test post-test method. The sample consisted of 31 individuals selected using a total sampling technique. The research instruments used were rheumatic gymnastics SOP and the Long-arm universal goniometer (UG) for measuring patella joint flexibility. Data were analyzed using the Wilcoxon statistical test. Results: There was an increase in the average value of right and left patella joint flexibility before and after the application of rheumatic gymnastics. The obtained P value was 0.005 for the right patella and 0.001 for the left patella. Both statistical analyses discovered that P-value was less than 0.05. Conclusion: Rheumatic gymnastics significantly affects patella joint flexibility in elderly patients with rheumatoid arthritis at the elderly integrated service post (Posyandu Lansia) in Mipiran Village, Purbalingga.*



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## 1. INTRODUCTION

Rheumatoid arthritis is a chronic (long-term) disease that causes pain, swelling, joint stiffness and limited joint movement. A common side effect of rheumatoid arthritis is fatigue. [1]. The most common autoimmune rheumatic disease, rheumatoid arthritis (RA), is a chronic inflammatory condition that permanently damages the joints. Rheumatoid arthritis, is an autoimmune disease in which the body's immune system, which normally protects the body from infection and disease, attacks the joint tissue for unknown reasons [2].

Pathophysiology of Rheumatoid Arthritis, namely the immune system genes caused by an unknown bacterial infection, gender, for women are more susceptible to RA especially if they are pregnant, post-natal,

or breastfeeding due to hormonal changes. Autoimmune attacks joint tissue which then attacks leukocytes. Synovial tissue (the transparent fluid that lines the joints) is affected because of this, causing inflammation which causes synovitis. The synovial membrane increases in the inflammatory phase causing enlargement of the joint. There is atrophy in the muscles, ligaments and tendons. This causes pain, stiffness and damage to the joints [2]. The immune system changes with age through a process known as immunosenescence. There is increasing evidence that the immune system of RA patients undergoes accelerated and premature aging [3].

Rheumatic gymnastics is a form of physical exercise that has a good effect on increasing joint muscle ability which can provide fitness and increase endurance. If muscles are trained frequently, synovial fluid will increase, thereby reducing the risk of injury and preventing knee pain in sufferers of arthritic knees. Active movements in rheumatic gymnastics aim to increase joint stability and strength of the muscles around the knee [8].

Based on data from Riskesdas in 2018, it is estimated that 7.30% of Indonesia's population suffers from rheumatoid arthritis [4]. According to data from the Ministry of Health of the Republic of Indonesia for 2019, Bali has the highest frequency of rheumatoid arthritis, namely 22.8%, followed by Aceh with 21.3% and Lampung with 14.5%. This is the result of a bad lifestyle [5]. Based on data from the Purbalingga district health service, in 2022 there will be 11,852 rheumatoid arthritis sufferers.

Many studies have been conducted regarding the effectiveness of rheumatic exercise, one of which is Sunandar et al's (2022) research which focuses more on its effectiveness in reducing knee pain, but this research is different from research related to the effectiveness of rheumatic exercise, this research focuses more on the effectiveness of rheumatic exercise on knee joints [8].

The results of a preliminary study conducted by researchers at the Padamara Health Center, Purbalingga Regency, found that there were 53 elderly sufferers of Rheumatoid Arthritis. Where the majority experience complaints such as pain and stiffness in their knee joints, which causes elderly people to experience difficulties or obstacles in carrying out activities. There have been no promotional efforts made by posyandu for elderly people with RA. Therefore, this study aims to determine the effectiveness of rheumatic exercises on patellar joint flexibility in elderly people with rheumatoid arthritis.

## 2. RESEARCH METHOD

The research design that the author uses is Pre-Experimental one group pre-test post-test. The number of samples in this study were elderly people with RA who met the research inclusion criteria, so 31 people were obtained. Which was taken using a total sampling technique (saturated sample technique). Research data were analyzed using Wilcoxon statistical test analysis.

The inclusion criteria used in this research are as follows, elderly people who are willing to become research respondents with an age range of 45 – 80 years elderly with rheumatoid arthritis with complaints in the knee joints for both men and women, elderly people who live in the work area of Integrated Service Post (Posyandu Lansia) In Mipiran Village, Purbalingga. while the exclusion criteria for this study are elderly people who are not willing to become research respondents, elderly who are on complete bed rest and unable to participate in exercise, elderly who have no history of rheumatoid arthritis, and elderly with rheumatoid arthritis whose complaints are not in the knee joints.

The results of a preliminary study conducted by researchers at the Padamara Health Center, Purbalingga Regency, found that there were 53 elderly sufferers of Rheumatoid Arthritis. Where the majority experience complaints such as pain and stiffness in their knee joints. Based on the inclusion criteria and exclusion criteria, the number of respondents obtained was 31.

The time during which this research was carried out was from 8 May - 1 June 2023 with a frequency of exercising 2 times a week so that the total exercise was 8 times. With a duration of ± 20-30 minutes of exercise, instructed by the researcher himself.

Data were collected directly on elderly people with rheumatoid arthritis who underwent rheumatic exercise, pre-test and post-test to determine its effectiveness on patella joint flexibility using a long-arm universal goniometer (UG). Researchers expects to obtain a P value < 0.05, so that the results of rheumatic exercise can be proven to be effective in increasing the flexibility of the patella joint.

This research obtained research ethics permission from the Health Research Ethics Committee of the Universitas Muhammadiyah Purwokerto with registration number: KEPK/UMP/35/IV/2023.

## 3. RESULT AND DISCUSSIONS

### 3.1. Univariat

Table1. Respondent Characteristics (n=31)

| Characteristics | Frequency N=31 | % |
|---|---|---|
| **Age** | | |
| 48 years | 2 | 6.5 |
| 49 years | 2 | 6.5 |

| Characteristics | Frequency N=31 | % |
|---|---|---|
| 51 years | 1 | 3.2 |
| 52 years | 2 | 6.5 |
| 53 years | 3 | 9.7 |
| 54 years | 2 | 6.5 |
| 55 years | 1 | 3.2 |
| 57 years | 2 | 6.5 |
| 58 years | 2 | 6.5 |
| 60 years | 1 | 3.2 |
| 61 years | 2 | 6.5 |
| 62 years | 2 | 6.5 |
| 63 years | 1 | 3.2 |
| 64 years | 1 | 3.2 |
| 65 years | 1 | 3.2 |
| 67 years | 1 | 3.2 |
| 68 years | 1 | 3.2 |
| 69 years | 1 | 3.2 |
| 72 years | 2 | 6.5 |
| 74 years | 1 | 3.2 |
| **Gender** | | |
| Female | 28 | 90.3 |
| Male | 3 | 9.7 |
| **Education** | | |
| Unschooled | 6 | 19.4 |
| Elementary School | 16 | 51.6 |
| Junior High School | 6 | 19.4 |
| High School | 3 | 9.7 |
| **Daily Activity** | | |
| Farmer | 8 | 25.8 |
| Trader | 7 | 22.6 |
| Laborer | 4 | 12.9 |
| Housewives | 12 | 38.7 |
| **Medicine Consumption** | | |
| When symptom occured | 22 | 71 |
| None | 9 | 29 |
| **Attempts Made when Symptom Occurred** | | |
| Does nothing | 9 | 29.0 |
| Massage | 13 | 41.9 |
| Compress in warm water | 3 | 9.7 |
| Checked to health service | 6 | 19.4 |
| **Duration of Suffering from RA** | | |
| ± < 1 year | 5 | 16.1 |
| ± 1-2 year(s) | 19 | 61.3 |
| ± >2 years | 7 | 22.6 |

Based on table 1 Shows that the age range of 53 years is the characteristic of the most respondents, namely as many as 3 (9.7%) as for age characteristics with mean±SD 58.7±7.532. For female gender, it is the characteristic of the most respondents, namely 28 (90.3%). For educational characteristics, elementary school is the most, namely 16 (51.6%). For daily activities, the most characteristics were housewives with a total of 12 (38.7%). For medicine consumption, the most characteristic was drug consumption when symptom appeared with a total of 22 (71%). Attempts made when symptom occurred, with the most characteristics using massage 13 (41.9%). For the duration of suffering from RA, the most characteristics were ± 1-2 years with a total of 19 (61.3%).

Table 2. Patella joint flexibility value before and after rheumatic gymnastics (n=31)

| Results | Mean | Median | SD | Min | Max |
|---|---|---|---|---|---|
| ***Pre-test*** | | | | | |
| Right patella | 123.44 | 126.50 | 13.20 | 90.4 | 141.0 |
| Left patella | 124.12 | 124.90 | 11.15 | 97.5 | 138.7 |

| Results | Mean | Median | SD | Min | Max |
|---|---|---|---|---|---|
| ***Post-test*** | | | | | |
| Right patella | 123.79 | 127.50 | 13.59 | 91.0 | 142.2 |
| Left patella | 124.46 | 125.30 | 11.46 | 95.5 | 139.2 |

Based on table 2, the data shows that the average value of flexibility of the patella joint before giving rheumatic exercises was 123.44 ± 13.20 for the right and 124.12 ± 11.15 for the left. Meanwhile, the average value of flexibility of the patella joint after giving rheumatic exercises was 123.79 ± 13.59 for the right and 124.46 ± 11.46 for the left.

### 3.2. Bivariat

Table 3. The effect of rheumatic gymnastics on patella joint flexibility in elderly with RA

| Variable | N | Median | mean±SD | Z | P |
|---|---|---|---|---|---|
| Pre-test right patella | 31 | 126.50 | 123.44±13.20 | -2.827 | 0.005 |
| Post-test right patella | 31 | 127.50 | 123.79±13.59 | | |
| Pre-test left patella | 31 | 124.90 | 124.12±11.15 | -3.276 | 0.001 |
| Post-test left patella | 31 | 125.30 | 124.46±11.46 | | |

The results of the Wilcoxon variable pre-test and post-test statistical test for the right patella joint showed P value of 0.005. Meanwhile, the pre-test and post-test variables for the left patellar joint showed P value of 0.001. The two data results from statistical analysis show that the P value is <0.05. And it can be concluded that there is an effect of giving rheumatic exercises on the flexibility of the patella joint in elderly people suffering from Rheumatoid Arthritis.

To measure the effect size of the treatment, we can use the formula of $r = \frac{Z}{\sqrt{N}}$, and the result of -0.55 and is in the category of large effect. And can be concluded that the rheumatic gymnastics has large effect on improving patella joint flexibility [12].

Age is a risk factor for rheumatoid arthritis, where the body's immune system changes with age through a process known as immunosenescence. The aging process affects the innate and adaptive immune systems. The innate immune system becomes non-specifically active with age, thereby contributing to increased chronic inflammation and comorbidities. The adaptive immune system becomes functionally impaired and undergoes phenotypical changes with age, contributing to a breakdown in immunological tolerance that contributes to the increased prevalence of autoimmune diseases [3].

Estrogen has a dichotomous impact on the immune system by downregulating the inflammatory immune response and upregulating immunoglobulin production. On the other hand, sex hormone metabolism in RA synovial tissue may not be favorable for female metabolism in synovial tissue [6].

According to Lawrence Green's theory, there are two basic influences on human behavior that affect health, namely, behavioral influences and non-behavioral influences, where the behavioral influences include age, gender, income, occupation, knowledge, education, attitudes, beliefs, and personal characteristics. and others are included as predisposing factors. Therefore, it can be said that the respondents' understanding of how to manage their rheumatoid arthritis is higher because they have higher education or knowledge [7].

Sunandar et al (2020) explained that the daily activities of elderly people can affect the joint health of elderly people with rheumatoid arthritis. In general, damage to joint cartilage occurs, mostly occurring in joints that often bear weight and bone formation on the joint surface. Damaged joint capsule components and the collagen present in the connective tissue increase progressively, which can cause inflammation, pain, decreased joint mobility, and deformity if no longer used [8].

According to study finding from Hidayat (2021), elderly people who underwent non-pharmacological management experienced a significant reduction in joint pain [9]. In fact, pharmacological management is superior to non-pharmacological management. Pharmacological techniques, however, may have unfavorable side effects and are more expensive. In contrast, pharmacological approaches are inexpensive, straightforward, prevent polypharmacy, and have no negative health impacts. Pain can also be managed with non-pharmacological management [9].

If the prognosis of the disease is not managed properly, changes in the form of juxtaarticular erosion and symmetric narrowing of the joint space will appear within the first 6 to 12 months of the course of the disease [10]. According to studies, decreased AR correlates with joint damage shown on joint X-rays. Long-term disease, patients who do not receive treatment, history of smoking, high titers of autoantibodies, and extra-

articular manifestations, which include initial radiological changes of the hands and wrists, especially joint erosions and loss of cartilage, are all associated with worsening radiological changes [10].

Range of motion and flexibility also increase as a result of practice, reducing movement limitations. Ende et al (2000) found that joint mobility increased as a result of a short-term intensive exercise program in RA patients with active disease. Joint proprioception has also been reported to improve after physical activity and worsen after immobilization or joint disease. This may be due to increased joint lubrication as a result of physical activity, which further acts to improve RA joint health [11].

Rheumatic gymnastics is a form of physical exercise that has a good effect on increasing the ability of joint muscles which can provide fitness and increase endurance. If the muscles are frequently trained, the synovial fluid will increase. Synovial fluid functions as a lubricant in the joints, meaning that the addition of synovial fluid to the joints can reduce the risk of injury and prevent knee pain in patients with knee rheumatism. Active movement in rheumatic gymnastics aims to increase joint stability and strength in the muscles around the knee, namely the Quadriceps, especially in the vastus medialis muscle because this movement is useful for reducing irritation that occurs on the surface of the patellar articular cartilage, maintaining and increasing active stability in the knee joint as well. can maintain nutrition in the synovial for the better [8].

## 4. CONCLUSION AND RECOMMENDATION

Based on the results of the research, rheumatic exercises can improve the flexibility of the patella joint in elderly people with rheumatoid arthritis. The value of the flexibility of the right patella joint before and after administering rheumatic exercises produces an asymp value. Sig (2-tailed) is 0.005 and the flexibility value of the left patella joint before and after administering rheumatic exercises produces an asymp value. Sig (2-tailed) is 0.001. From the two statistical analysis data, it shows that P value <0.05, and it can be concluded that there is an effect of giving rheumatic gymnastics on the flexibility of the patella joint in elderly patients with rheumatoid arthritis in the elderly Posyandu in Mipiran village, Purbalingga.

Researcher expects that patients with RA can apply non-pharmacological therapy in treating rheumatoid arthritis by doing regular rheumatic gymnastics for RA sufferers. For further research, it is expects to be able to examine the relationship or influence of daily activities and/or work history of elderly people with RA on the level of joint flexibility.

**Acknowledgements**

The author would like to thank the Universitas Muhammadiyah Purwokerto for providing moral and financial support for this research.

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